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P A P E R S  
IN  
*A G R I C U L T U R E.*

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N<sup>o</sup> I.  
RAISING OAKS FOR TIMBER.

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*The large GOLD MEDAL of the Society, the premium offered, was this Session awarded to CHARLES FYSHE PALMER, Esq. M. P. for planting 30,700 OAKS FOR TIMBER. The following communication has been received on the subject from Mr. PALMER.*

SIR;

Wokingham,  
February 1821.

**O**BSERVING that a premium has been offered to the person who shall have raised, since the year 1816, the greatest number of Oaks, either from young plants or acorns, in order to secure a succession of oak timber in this kingdom, I beg leave to state to your Society, that in the month of February 1816, I planted, on the forest land near Wokingham, not calculated for the purposes of husbandry, 700 oaks, above five feet in

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height, and at the distance of several yards from each other ; also 10,000 oaks, which had been three years bedded. That in the month of October 1817, I planted 23,000 oaks, above two feet in height, and standing in lines about five feet apart, the ground having been previously prepared by the instruments described by me in the accompanying communication ; and that in February 1818 I planted out 7,000 four years old plants.

I am, Sir,

*A. Aikin, Esq.,*

&c. &c. &c.

*Secretary, &c. &c.*

CHARLES FYSHE PALMER.

#### CERTIFICATE.

WE whose names are hereunto subscribed, do hereby certify that we are well acquainted with the plantations, and that we believe the foregoing statement to be true and correct.

THOMAS MORRES, *Minister.*

J. WEBB.

W. LANE.

JOHN ROBERTS.

EDWARD HORNE.

W. B. TRICKEY.

JOHN CHURCHMAN.

WILLIAM LANE, jun.

EDWARD SMITH.

JOHN BROWN.

Nº II.

RAISING OAKS FOR TIMBER.



*The small or CERES GOLD MEDAL was this Session presented to SIR WILLIAM TEMPLER POLE, Bart. of Shute-house, near Axminster, Devon, for having raised 896,000 Oaks from acorns.*

A CERTAIN time being fixed by the Society for the reception of claims for the several premiums offered for planting, it would be manifestly unjust towards those claimants who have complied with this condition, to admit as competitors with them, those who, from inadvertence or any other cause, have failed in this respect.

Sir W. Templer Pole was unfortunately in this situation, his first communication not having arrived till three weeks after the appointed time. Under these circumstances, the Committee, to whom the matter was referred, came to the following resolutions, which were adopted by the Society :—

“ It is the opinion of this Committee, that Sir W. Templer Pole's claim for raising oaks, though otherwise entitled to the highest premium, cannot receive it, his communication not having been made within the prescribed time; but in consideration of the importance and extent of his plantations, they recommend to the Society to present him with the Gold Ceres Medal.

“ They farther recommend to the Society to instruct the Secretary to write to Sir W. Templer Pole, expressing the high sense the Society entertain of the public spirit which suggested and carried into execution his highly important and valuable plantations ; and lamenting that an informality respecting the time of sending in the claim, should have prevented them from awarding to him the highest premium, which they feel to be pre-eminently due to his exertions.”

The following communications have been received from Sir W. T. Pole on the subject :

SIR;

Shute House, near Axminster, Devonshire,  
February 19th, 1821.

I respectfully offer myself a candidate for the Gold Medal advertised by the Society of Arts, for raising Oaks since 1816.

I beg leave to observe, that three years since, I planted, in the richest garden ground, about 98 bushels of prime acorns, collected from the finest and best-formed oaks in my park, which are the largest in this county ; that I thereby found employment for many who were almost starving for want of work, and that I can produce certificates from surveyors and nurserymen, that I have, at the most moderate computation, at the least 500,000 trees in the finest condition, though I should speak within compass, if I stated them at three times that number.

Allow me to beg for the form of the necessary certificate, and to express my hope that you will lay this letter before the Society.

I am, Sir,

&c. &c. &c.

WILLIAM TEMPLER POLE, *Bart.*

SIR;

Shute House, near Axminster,  
February 21st, 1821.

I beg leave to transmit you a certificate of my having planted such a number of oak trees, as I flatter myself will entitle me to the Gold Medal offered by the Society of Arts, a premium I should greatly esteem, and which could not fail to encourage my future exertions.

I am, Sir,  
&c. &c. &c.

W. TEMPLER POLE.

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CERTIFICATE.

February 21st, 1821.

WE the undersigned do hereby certify, that to the best of our judgment and belief, there are now growing in the nurseries of Sir William Templer Pole, Baronet, in the parish of Shute, and county of Devon, at least 896,000 prime oak trees of nearly three years growth, from acorns; that the trees are in a very thriving state, kept perfectly free from weeds, and fenced in a very secure manner; that he procured every acorn from trees fit for the largest ship timber in his majesty's navy, and that we verily believe Sir William Templer Pole has more oak in his nurseries than any gentleman or nurseryman in the west of England. We also certify, that on an average he has planted out upon his estate annually at least 30,000 forest trees for fifteen years past; that this year he has planted out above 46,000, and that he has above 50,000 trees of sorts ready to go out in 1822.

(Signed) RICHARD PHIPPEN, *Nurseryman and Planter.*

JOHN ROWELL.

SAMUEL SAMPSON.

## N° III.

## PLANTING FOREST TREES.

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*The large GOLD MEDAL of the Society, the premium offered, was this Session awarded to CHARLES FYSHE PALMER, Esq., M. P., of Wokingham, Berks, for planting 280 acres with 893,420 FOREST TREES. The following communication has been received on the subject from Mr. PALMER.*

SIR;

March, 29th, 1820.

ENCOURAGED by the approbation which my former exertions in planting Forest Trees met from your patriotic Society, and ambitious of again meriting the honourable distinction of its notice, I take the liberty of laying before the Society, in addition to the usual certificates, some details of the process I have adopted, for converting what was a barren and unprofitable portion of forest into thriving and valuable plantations.

The two ploughs which I used in 1816 to prepare the forest land for the reception of plants, were so constructed as to require their being worked at the same time; and as the accidental failure in one of the ploughs frequently suspended the labour of both teams, I applied myself during the Sum-

mer of 1816, to the construction of other implements, by which the labour and expense have been reduced to one-fourth, and I have been enabled to carry on my work as extensively with half the number of horses required in the preceding year.

It had always been my object, as a planter, to remove and clear away the heathy surface of the forest land, and to loosen the ground beneath it to such an extent as would allow the tender fibres of the roots to extend themselves, without obstruction, until the plants attained a size and strength sufficient to force their way into the soil.

For this purpose I constructed a cutter or shaver of a triangular form, two feet in breadth, and armed at the point and sides with the best and hardest materials that Mr. Galloway of Holborn could manufacture. To this instrument I fastened two turn-boards, and the beam and handles of a common plough, and with the power of four horses I have been able to clear off the heathy surface with great ease and expedition, and to leave a clear space of two feet in breadth.

My next object was, to loosen the interior of the ground that had been thus pared and cleared from the incumbrance of heath and of its fibrous tangled roots, and to prepare it for the reception of plants. For this purpose I constructed a very strong plough, without any turn-board; and having lengthened the chief or standard to fifteen inches, I attached a very strong ploughshare, with fins on each side, extending about eight inches, and worked it with six horses, such as are commonly used for agricultural purposes. I have been able to make this instrument penetrate the soil to the depth of fifteen inches, and to proceed in thoroughly loosening the ground at a slow but regular pace; and as a proof that this process was not imperfectly performed, it may be proper for me to state, that all my plants were put into the ground at



eighteen pence per thousand, the price commonly paid by nurserymen.

This mode of planting, and the construction of the implements which I have used during two successive years, in preparing many hundred acres of waste land, I beg leave to submit to the notice of the Society, and to point out the advantages immediately resulting from them.

The first is, that the ground having been well pulverised in the first instance, the plants, in case of failure, can be replaced with little expense of labour.

Secondly, the young plantations are thus secured in a great degree, from the destructive effects of fire, by which both myself and my neighbours had greatly suffered.

The trees in each line stand at the distance of three feet apart, and the different lines at five feet from each other.

*Number of Trees planted on 280 Acres of Forest Land, not calculated to repay the Expense of Tillage, in the Parishes of Wokingham and Finchampstead, Berks.*

Scotch Fir .....	566,400
Norway Spruce .....	110,000
Larch .....	68,700
Willow .....	66,200
Sycamore .....	48,000
Oak .....	30,200
Ash .....	3,200
Birch .....	700
Chesnut .....	20

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893,420

CHARLES FYSHE PALMER.

CERTIFICATES.

March 29th, 1820.

WE, the undersigned, do hereby certify the plantations above described to be in a healthy and thriving state.

THOMAS MORRES, *Minister of Wokingham.*

JAMES WEBB,

EDWARD HORNE,

WM. LANE,

JOHN CHURCHMAN—*Inhabitants of the Town and Parish of Wokingham.*

In order to convince the Society that the ground on which my plantations have been made is, notwithstanding the depth or rather the looseness of the soil, wholly unfit for cultivation, I beg leave to inclose a certificate from Mr. Smallpiece, the commissioner for making the inclosure, and another signed by the principal inhabitants of Wokingham. I also subjoin a letter from Mr. Walter, showing the result of an attempt made by him to bring a portion of this forest land under culture.

Guildford, April 28th, 1821.

I hereby certify, that the land planted by Charles Fyshe Palmer, esq. in the parishes of Wokingham and Finchampstead, in the county of Berks, is not fit for cultivation.

B. SMALLPIECE, *Commissioner for Inclosing the above Parishes.*

SIR;

April 22nd, 1821.

WE, whose names are hereunto subscribed, beg leave to certify to you, for the information of the Board of the Society of Arts, that the lands which have been lately planted with oak, firs, and other forest trees, by Charles Fyshe Palmer, esq. in the parishes of Wokingham and Finchampstead, were

late part of the waste lands of Windsor Forest; and with the exception of a few small parcels, are wholly unfit for the purposes of cultivation. By much the greater part is considered not to exceed in value from five to six pounds per acre for the fee simple. One hundred acres, part of which is included in the said plantations, were purchased at auction at something less than five pounds per acre.

JOHN ROBERTS, *of Wokingham, Solicitor.*

EDWARD HORNE,

WM. LANE—*Churchwardens of Wokingham.*

PAUL HOLTON,

THOMAS CREAKER,

P. BROWNE—*Members of the Corporation of Wokingham.*

JOHN CHURCHMAN, *an Inhabitant of Wokingham.*

W. B. TRICKEY, *Town Clerk of Wokingham.*

DEAR SIR;

Holyport, May 3, 1821.

I HAVE been favoured with your letter of inquiries relative to my farming the heath-land at Wokingham, purchased under the Inclosure Act, and situate adjoining to that you have planted, and I should have answered them earlier, but have been from home.

You are aware that my purchase consists of 80 acres of land, of about the average quality of the Heath. I selected five acres of the best of my whole quantity, and indeed as good as any of the Heath, if I except narrow slips adjoining the old inclosures, which for time out of mind have been trodden and manured by the cattle going thither for shelter both from heat and cold. These five acres I first trenched 18 inches deep, then plowed and sowed with carrots; the expence

of trenching, plowing, and sowing, was about 2*l.* 10*s.* per acre, and seed about 2*s.* 6*d.* The whole produce of the five acres might be about ten bushels.

I then chalked the land at an expense of 4*l.* per acre, and planted potatoes, about ten bushels to the acre, the cost of seed and planting amounting to about 1*l.* per acre, the produce of which was brought away in a small cart, probably about 20 bushels, from the five acres. In some few instances the potatoes were as large as an egg, but in general from the size of a walnut to that of a pea; and in many spots, where there was a vein of sand, they had not vegetated at all. I then trenched ten acres more, and limed it, at the expense of 5*l.* per acre, and sowed turnips, but the crop was not worth turning sheep into; and last year I sowed rye, and sold the crop standing at 1*l.* per acre, but grew so weary of my ill success, that I have now planted the whole with seedling larch, which I flatter myself will, by their growth, repay me the money laid out in attempting cultivation.

I do, however, think, notwithstanding the little prospect there may be of cultivating with success a large portion of this heath land, that some spots may be found, and this piece of mine amongst the number, which might yield a return, provided they were so situate as to be well manured and chalked, and trod with cattle; but the money which must necessarily be sunk in the operations, would more than purchase the fee of the land in its improved state, without taking into calculation the cost of erecting buildings, which are indispensable to the improvement of the land to any extent.

I am, Sir,

&c. &c. &c.

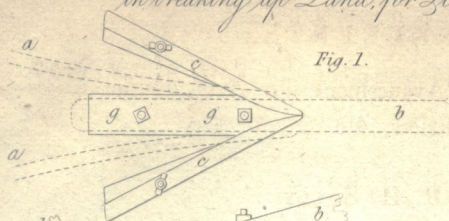
H. WALTER.

*To Charles Fyshe Palmer, esq.*

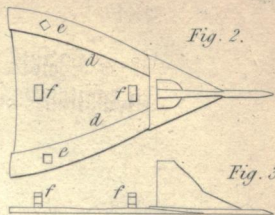
*Reference to the Engravings of the Instruments used by  
C. F. Palmer, esq. in breaking up Land for Planting  
Forest Trees, Plate I.*

Previous to grubbing up the earth to a considerable depth, the heath and turf were pared off the surface by a plough, the wood-work of which consisted of a beam and handles of the usual construction, shown by dotted lines in the plan or bird's-eye view, fig. 1 (*a a* the handles, *b* the beam), and of two turn-furrows *c c* two feet three inches long, nine inches wide, and two inches thick, the lower edges and fronts cased with iron; the fore part of the beam is supported on two cast-iron wheels, twenty-two inches diameter. The draught of the horses (sometimes four at others six being employed) is applied on the top of the beam immediately over the points or fronts of the turn-furrows. The cutter, fig. 2, is formed of a flat plate of iron *d d*, about three-eighths of an inch thick, having the cutting edges forged separately, and rivetted on it. On the fore-part is fixed an upright cutter, preceding the turn-furrows, shown in the section, fig. 3. The cutter is attached to the wood-work by four screw bolts, one passing through each turn-furrow, and retaining it at *e e*, the two others passing through the beam, and terminating at the lower end in hooks, forming a right angle, as seen in fig. 4, on to which are slipped the two eyes *f f*, and the nuts are then made tight: *g g*, in figs. 1 and 4, represent a piece of wood lying between the turn-furrows, and immediately over the cutters; this piece has two mortises in its under surface to allow the application of the eyes *f f* to the hooks on the screw bolts. The piece *g g* is fastened to the turn-furrows, and is connected to the beam and to the handles by two iron bars; the lower portion of one of them is seen at *h*, fig. 4. This plough was used for paring the heath and turf from the hard grounds; on the lighter soils another

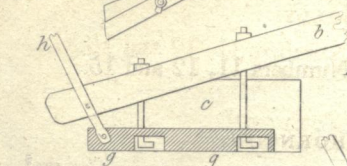
*Instruments used by C. F. Palmer, Esq.<sup>r</sup> Pl. 1.  
in breaking up Land, for Planting Forest Trees.*



*Fig. 1.*



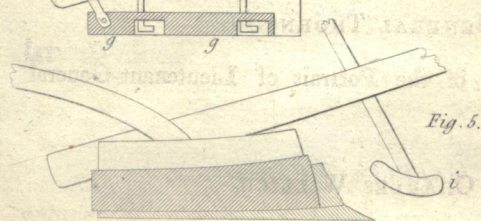
*Fig. 2.*



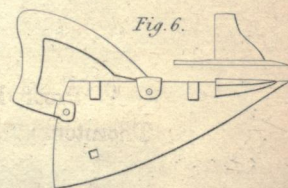
*Fig. 4.*



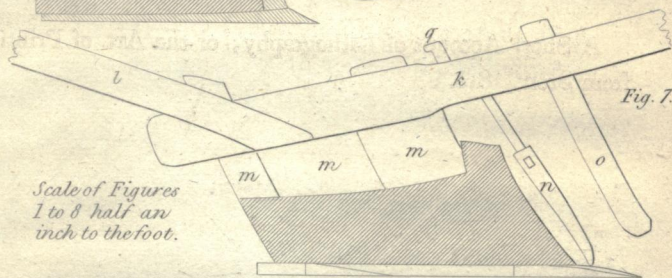
*Fig. 3.*



*Fig. 5.*

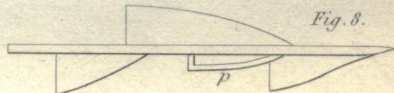


*Fig. 6.*

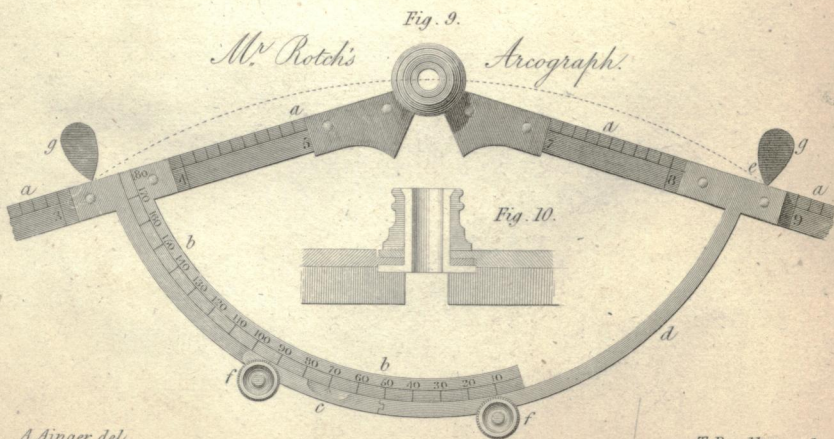


*Fig. 7.*

*Scale of Figures  
1 to 8 half an  
inch to the foot.*

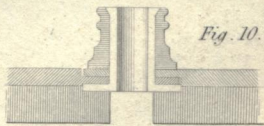


*Fig. 8.*



*Fig. 9.*

*Mr. Rotch's Arcograph.*



*Fig. 10.*

*A. Ainger, del.*

*T. Bradley, sculp.*

instrument, not differing materially in the wood-work (except in being generally lighter) was used; affixed to this is a cutter, formed as described in fig. 6, the lateral and anterior edges made cutting, and the whole attached to the wood-work nearly as described in fig. 1. In order to prevent the cutter from sinking too deep into the earth, or becoming clogged with the loose soil, it was preceded by a curved piece of wood, *i*, fig. 5, eleven inches by three inches, attached to a stem passing through a mortise in the beam, by which its depth could be regulated at pleasure. The shaded part in fig. 5 shows how much of the turn-furrows were cased with iron.

After the surface had been pared by one of these instruments, the ground was loosened to a considerable depth by the plough, fig. 7; it consists of a strong beam *k*, and handles *l*, the former six inches square at the lower end, and of a pitching, formed wholly of two-inch stuff, contained in the three pieces *m m m*, and cased with iron, where shaded with diagonal lines. This pitching is preceded by a tuch *n* and coulter *o* of the usual construction, but of large dimensions. On the under side of the pitching is fixed a cutter, fig. 8, formed of a bar two inches by one inch, having two fins rivetted or bolted to one side of it, and one fin to the other, the outer edges of the fins being made cutting, and the inner about a quarter of an inch thick. The strap *p* is merely for the purpose of attaching it to the wood-work. The draught is applied to the iron stud *q*, and the beam of this plough is also supported on two wheels.

The cutters actually used in the operations may be seen in the Repository of the Society.

## N° IV.

## PLANTING FOREST TREES.

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*The large SILVER MEDAL, the second Premium offered, was this Session awarded to HENRY POTTS, Esq. of Chester, for planting 194 Acres with 528,240 Forest Trees. The following communication has been received on the subject from Mr. POTTS.*

SIR;

I BEG leave to transmit to you an account of a plantation made by me, between the months of October, 1817, and April, 1818, on some mountainous land in the parish of Llanferres, in the county of Denbigh, containing one hundred and ninety acres, which I shall feel obliged by your laying before the Committee of the Society for the encouragement of Arts, Manufactures, and Commerce.

The land in question consists of a ridge of limestone rocks, running nearly north and south, and sloping from the summit towards the east and west. Between the rocks there are large tracts of good red soil, consisting of about one hundred and twelve acres, well adapted for the growth of deciduous forest trees, though, from their elevation, not capable of improvement by the plough. The remainder of the plantation consists of rocky and uneven ground, in which there are, however, interspersed many considerable patches of soil suited for planting, and the crevices and fissures of the rocks appear (judging



from some plantations in the neighbourhood belonging to me, formed on similar sites) to be also favourable to trees.

This plantation was made by Messrs. Archibald Dickson and Sons, of Hassendean-burn, near Hawick, North Britain. In the more favourable situations, the plants were put down at the distance of four feet from each other, and were of the following descriptions, viz.

One-fourth transplanted Ash and Oak, with an admixture of Beech, Sycamore, and Elms.

One-fourth, one and two year transplanted Scotch Fir.

One-half transplanted Larches of different sizes.

The larger trees were all pitted.

In the more exposed and rocky places, the plants were set at about three feet and a half apart, or as close to each other as the nature of the ground would allow of, and were principally two years old seedling larch and Scotch fir. They were chiefly nicked in. The number of trees planted was—

17,400	Oaks,	9 to 15 inches.
6,100	Planes,	1½ to 2 feet.
4,400	Ditto,	12 to 18 inches.
7,660	Scotch Elms,	12 to 21 inches.
9,000	Beeches,	9 to 15 inches.
20,860	Ashes,	12 to 24 inches.
900	Silver Firs,	7 to 12 inches.
960	Birches,	12 to 18 inches.
960	Spanish Chesnuts,	15 to 21 inches.
38,000	Scotch firs,	2 years old, transplanted.
15,000	Ditto	- 1 year - ditto
120,600	Larches,	transplanted, 9 to 18 inches.
15,400	Ditto	- ditto - 6 to 12 inches.
151,000	Scotch Firs,	2 years seedlings.
120,000	Larches	- ditto - ditto.

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528,240

The seasons have been favourable for the growth of trees since this plantation was made, and the whole appear to be in a very thriving and promising state.

I have taken great care to preserve this plantation from injury by sheep and cattle. On three sides it is protected by stone walls of five and six feet in height, and 314 roods (or rods) in length. On the sides most exposed to trespass of that description, the walls for 212 roods are six feet high, 125 roods of the loftier walls being well plastered on the outside to prevent sheep getting any footing on the projecting stones. Within the walls I have planted good quicksets at 6 inches apart, which have been properly weeded, and are growing well. On the fourth side of the plantation, which adjoins to cultivated lands, it is well protected by good hazle and thorn fences.

I transmit you a certificate from Messrs. A. Dickson and Sons, as to the kinds and numbers of trees planted, and their present appearance, and from my bailiff, confirming their account as to the number of trees furnished by them ; also from Thomas Lewis, esq. and the Rev. Ellis Wynne, gentlemen resident in the parish of Llanferres, as to the present state of the plantation and the fences.

In the Spring of 1818, I also planted over four acres of land at Nant Stabal, in the parish of Llanferres, with two years old transplanted larch and Scotch firs, set at about the distance of four or four feet and a half apart. This plantation is inclosed with a stone wall, five feet high, on the most exposed side, and with a quickset hedge, protected by posts and rails, and a three foot wall on the other sides. I also, in the same season, caused the vacancies in several newly-made plantations at Maes y Safn, and other places in the same parish, amounting at least to 20 acres, to be carefully filled up with transplanted oaks, and other forest trees. For

this purpose, Mr. John Rogers, of Chester, nurseryman, supplied me with 19,600 plants; the remainder were taken out of my own nurseries. These trees have in general succeeded, and are doing well.

Between the month of October, 1818, and April, 1819, I replanted two woods belonging to me, which had been cleared by a fall of timber. One of these woods, called Coed y Felin, is in the parish of Llanferres, and consists of nine acres; some of the old timber having been left for ornament, I think that about six acres were replanted. This wood is well sheltered, and trees of considerable size are now growing upon it. The plants I put down were chiefly oak, beech, sycamore, and larch, two feet high, and planted about four feet asunder. These trees are now growing very well. The other wood, so replanted, is upon a farm called Maes y Groes, in the adjoining parish of Kilken, and county of Flint. It consists of several dingles, containing together 25 acres, well sheltered, and particularly favourable to the growth of oak trees. The most valuable timber having been cut down about six years since, before the farm came into my possession, the fences were much neglected, and cattle suffered to brouse the young shoots rising from the stools of the trees fallen, and no young trees had been planted to replace those that had been cut down. In this state I found it, and immediately proceeded to repair the fences, and to cause the young saplings to be pruned, and the underwood cleared away, so as to allow of the wood's being regularly replanted. This was done with oaks, from two to three feet high, set at the distance of nine feet from each other, and the intervals filled up with larch, sycamore, and beech, of about the same height, at four feet and a half apart, as nurses to the oaks. I calculate that the quantity of land entirely replanted may be about 18 acres. The young trees are very thriving. The

fences round the two last-mentioned plantations are of hazel, thorn, &c. and are made secure against trespass by cattle.

I send you herewith a certificate from Mr. John Rogers, of Chester, nurseryman, of the number of trees furnished by him to me between the months of November, 1818, and February, 1819; and my bailiff Thomas Ellis's certificate, speaks as to their having been properly planted out, and as to the number of plants taken from my own nursery, and the present condition of the two last-mentioned plantations, and of the fences around them.

Though these two plantations were not made at the same period of the year 1818, as that formed by Messrs. Dickson and Sons, and may not in strictness come within the terms of the Society's offer of a premium for the planting of Waste Lands, nor be considered as entitled to that or any other premium, I trust I shall be excused for having mentioned them. I also take the liberty of adding, that I continue my efforts for the improvement of my property and the face of the country, by covering the unproductive land with timber. I have, in the course of the last year (1820), inclosed and planted about nine acres of a well-sheltered dingle, in Llanferres, with two-year-old transplanted oaks, at the distance of eight feet from each other, with transplanted larches and Scotch firs, intermixed, at the distance of four feet apart, as nurses; and in the years 1819 and 1820, I also planted about 25 acres (being part of a large tract of moorish, and totally unproductive land in the same parish, which had been inclosed with stone walls) with two-year-old seedling Scotch firs and larches, intermixed with a few seedling oaks and alders. Some acres of the land last mentioned had been planted about the year 1817, but the trees had in general failed; which I attribute to the circumstance of the plants used being rather too large, and more particularly to the mode of planting them,

which was by making pits for the trees. These pits formed receptacles for the water during the winter months, and the roots of the trees rotted. The seedlings planted by me were *nicked* in, and seem likely to succeed.

I am, Sir,

*A. Aikin, Esq.*

&c. &c. &c.

*Secretary, &c. &c.*

HENRY POTTS.

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CERTIFICATES.

To the Honourable the Society of Arts, Commerce,  
and Manufactures, Adelphi, London;

I, Archibald Dickson, the younger, of Hassendeanburn, near Hawick, in the county of Roxburgh, nurseryman, do hereby certify, that in the month of November, 1817, I, together with Archibald Dickson, senior, and James Dickson, my co-partners, contracted with Henry Potts, of the city of Chester, esquire, to plant for him with forest trees, 180 acres of land, in the parish of Llanferres, in the county of Denbigh; 112 acres of which appeared to be well calculated for the growth of deciduous timber, and the remainder chiefly adapted for larch and fir trees. The terms of our engagement were, that on the above-mentioned 112 acres, the trees should be planted at the distance of four feet apart from each other, and on the remainder, at the distance of three feet and a half, or as near as the nature of the ground would admit of. I also certify, that in the month of December, 1817, and in the course of the following Spring, we actually planted for him there—

17,400 Oaks, 9 to 15 inches.

6,100 Planes,  $1\frac{1}{2}$  to 2 feet.

4,400 Ditto, 12 to 18 inches.

7,660 Scotch Elms, 12 to 21 inches.

9,000	Beeches,	9 to 15 inches.
20,860	Ashes,	12 to 24 inches.
900	Silver Firs,	7 to 12 inches.
960	Birches,	12 to 18 inches.
960	Spanish Chesnuts,	12 to 21 inches.
38,000	Scotch Firs,	2 years, transplanted.
15,000	Ditto	- 1 year, ditto.
120,600	Larches transplanted,	9 to 18 inches.
15,400	Ditto	- - 6 to 12 inches.
151,000	Scotch Firs,	2 years seedlings.
120,000	Larches	- 2 years, ditto.
<hr/>		
528,240		

And I further certify, that in the month of November, 1820, I viewed the plantation so formed; that the trees appeared to be growing well, and that all vacancies occasioned by death had been properly filled up; and that there are now growing and in a thriving state in the said plantation, at least the number of trees above specified. The walls and other fences round the plantation appear to be well and substantially made. Witness my hand this 15th day of January, 1821.

ARCHIBALD DICKSON, jun.

To the Honourable the Society of Arts, Commerce,  
and Manufactures, Adelphi, London;

I, Thomas Lewis of Glanrafon, in the parish of Llanferres, in the county of Denbigh, esq. do certify, that I am well acquainted with the large plantation in the parish of Llanferres aforesaid, made by Henry Potts, of Chester, esq. in the Spring of the year 1818, consisting of 180 acres of land, or upwards. That it is surrounded on three sides by a stone wall, and on the other side by a sufficient live wood fence, and the trees are completely secured from depredation. That I

have seen the same several times in the course of the last Autumn, when the plants seemed to be in a very thriving state, and the plantation promises to become very profitable. And I further certify, that I have several times lately viewed two woods belonging to Mr. Potts, called Coed y Felin and Macs y Groes Woods, which have been lately replanted by him. That the young trees which have been set in those woods, as well as in various other plantations belonging to Mr. Potts, at Nant Stabal, Macs y Safn, and elsewhere in the parish of Llanferres, appear to be very thriving, and are properly secured from trespass. Witness my hand, this 19th day of January, 1821.

THOMAS LEWIS.

To the Honourable the Society of Arts, Commerce,  
and Manufactures, Adelphi, London ;

I, the Rev. Ellis Wynne, clerk, rector of the parish of Llanferres, in the county of Denbigh, do certify, that I have several times, in the course of the last Summer, viewed the large plantation in that parish, made by Henry Potts, of Chester, esq. in the year 1818, amounting to about 180 acres, and that the trees therein grow well, and seem likely to form a very thriving plantation. The whole is surrounded by stone walls, or sufficient hedges, and the trees are effectually protected from trespass. Witness my hand, this 17th day of January, 1821.

ELLIS WYNNE, *Rector of the Parish of  
Llanferres.*

To the Honourable the Society of Arts, Commerce,  
and Manufactures, Adelphi, London ;

I, John Rogers, of the city of Chester, nurseryman, do certify, that in the months of February and March, in the year 1818, I furnished to Henry Potts, of the same city, esq.

the following forest trees, which were sent to his estate in Llanferres, in the county of Denbigh:

8,700 Scotch Firs.  
 2,300 Larch.  
 1,300 Oaks.  
 500 Sycamore.  
 2,000 Spruce Firs.  
 1,500 Beech.  
 500 Alders.  
 300 Birch.  
 2,000 Larch Firs.  
 500 Ash.

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19,600

And in the month of November, 1818, and January and February, 1819, I also supplied Mr. Potts with the under-mentioned Forest Trees, which were also sent to his estate at Llanferres.

12,250 Larch.  
 6,000 Oaks.  
 1,050 Beech.  
 200 Scotch Firs.  
 200 Sycamore.  
 50 Ash.  
 50 Birch.

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19,800

Witness my hand, this 16th day of January, 1821.

JOHN ROGERS.

To the Honourable the Society of Arts, Commerce,  
 and Manufactures, Adelphi, London;

I, Thomas Ellis, of Llanferres, in the county of Denbigh,  
 bailiff or agent to Henry Potts, of the city of Chester, esq.



do hereby certify, that I was directed by Mr. Potts to look after the workmen employed by Messrs. Dickson and Co. in planting for him a large tract of land in Llanferres, in the Spring of the year 1818. That the plants used on the better part of the land were transplanted deciduous trees, with Scotch fir and larch of the like description intermixed, and they were set at the distance of four feet from each other. That the plants used in the more rocky and exposed places were chiefly two-year-old seedling Scotch fir and larches, and were planted at the distance of from three feet to three feet and a half apart, or as near to each other as the nature of the ground would admit of. And that I verily believe that there were about three thousand trees used for each statute acre of the land planted. That these trees were all healthy and well rooted, and were very well planted. And I do further certify, that all vacancies occasioned by death or accident have been regularly filled up, and the whole plantation is now in a thriving and promising state.

I also certify, that the fences round the said plantation are good and substantial, two sides thereof having been secured by stone walls six feet in height, being in length two hundred and twelve roods, one hundred and twenty-five roods whereof are well plastered on the outside as a protection against sheep. The third side is fenced by a stone wall five feet high, and of the length of one hundred and two roods; and that the fence on the fourth side where the plantation adjoins to the ancient inclosed lands is well made with live wood, and is a sufficient defence against cattle. And that strong quickset plants were set within the walls round the plantation, at the distance of six inches from each other, which have been properly weeded, and are growing well. And I further certify, that between the first week in December, 1817, and the first week of April, 1818, I planted for Mr. Potts four acres of land, at Nant

Stabal, in Llanferres, with two-year-old transplanted larch and Scotch firs, at the distance of from four to four feet and a half asunder. This plantation is well protected from cattle by a stone wall and a hedge, with posts and rails set on a three-foot wall. I also within the same period filled up the vacancies in several newly-made plantations belonging to Mr. Potts, at Maes y Safn, Nant Stabal, Pant ryd ynog, and elsewhere, in the parish of Llanferres, containing at least twenty acres, by carefully replacing the trees that were dead, with transplanted oaks, beech, and other forest trees, of which I received nineteen thousand six hundred from Mr. John Rogers, of Chester, nurseryman, and the remainder were taken out of Mr. Potts's nursery, at Llanferres. I further certify, that all these plantations are well secured from trespass by cattle, and the trees I planted have in general lived, and are doing well. And I further certify, that in the winter of the year 1818, I received from the said John Rogers, nineteen thousand eight hundred forest trees, which, with twenty-five thousand oaks, beech, larch, and other trees taken out of Mr. Potts's nursery, in Llanferres, were planted by me, or under my direction, between the month of October, 1818, and the month of April, 1819, in two woods belonging to Mr. Potts, the timber in which had been cut down, and the underwood cleared away. That in one of these woods called Coed y Felin, in Llanferres aforesaid, containing nine acres of land; the plants used were oak, ash, elm, beech, and larch; and they were planted about four feet from each other; but as the trees in part of this wood were left standing for ornament, the whole wood was not replanted, but I verily believe that there were at least six acres entirely replanted. That the other wood on Maes y Groes farm, in the parish of Kilken, consisting of about twenty-five acres, the young saplings which had arisen from the stools of oaks fallen about six years since, before the

farm came into Mr. Potts's possession, were carefully pruned, and the underwood cut away, so as to allow of the land being regularly replanted. In some parts a few old trees remained, with a considerable number of saplings, but I believe that the whole quantity of land replanted by me here was at least eighteen acres. This was done with oaks, two feet high, set at the distance of nine feet from each other, with larches, beech, and sycamore, intermixed as nurses, making the distance from tree to tree four feet and a half. I have frequently gone over these woods, and replaced such trees as have died or been accidentally injured. I have seen them this day, and certify, that the whole are in a thriving state, and likely to make a valuable plantation of oaks. The fences have been carefully attended to, and are all in good condition. I also certify, that in the month of January and February, 1820, I inclosed, by Mr. Potts's direction, nine acres of land in a well-sheltered dingle, near Brynrodin, in the parish of Llanferres, particularly calculated for the growth of oaks, with stone walls and strong quickset hedges and banks, and planted the same with two-year-old transplanted oaks, at the distance of eight feet apart, with larches, Scotch firs, and beech between them, at four feet asunder, and that these trees are all growing remarkably well. Also in the years 1819 and 1820, I planted for Mr. Potts about twenty-five acres of land, near Pant Dû, in Llanferres aforesaid, on a spungy moist bottom, with two-year-old seedling larches and Scotch firs, with a few oaks and alders intermixed. These trees are well protected from cattle by stone walls, and seem likely to succeed. Witness my hand this 15th day of January, 1821.

THOMAS ELLIS.

N<sup>o</sup> V.

## SOWING ACORNS.

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*The large GOLD MEDAL, being the premium offered, was this Session voted to THOMAS WILKINSON, Esq., of Fitzroy Square, London, for SOWING 240 BUSHELS OF ACORNS on 260 Acres. The following communication has been received on the subject from Mr. WILKINSON.*

SIR;

8, Fitzroy Square,  
January 8th, 1821.

As a candidate for the Gold Medal offered by the Society of Arts, &c., for sowing acorns, I beg leave to transmit a certificate of my having planted 120 acres of land with acorns, in the months of October, November, and December 1818, agreeably to the conditions of the Society, and shall feel highly flattered should they deem it worthy of the premium.

I purchased the estate, consisting of 2,600 acres, in the Spring of that year, and the part which is planted is chiefly covered with heath, bilberries, and other mountain berries, with some furze, fern, &c.; the whole is very much encumbered with large loose stones peculiar to the neighbourhood, with which the wall, as described in the appendix to the certificate, was built, to inclose part of the land planted, from the Stiperstones-hill, which is considered the highest ground in the county.

I likewise at the same time planted 140 acres, in addition to the 120, which are not included in the certificate, for the reasons stated in the appendix.

Any further information upon the subject, in addition to the certificate and appendix, which the Society may think necessary, will with pleasure be communicated, by Mr. Samuel Smith, of No. 10, Gray's-inn-square, who has the management of the estate, and under whose direction and immediate inspection the whole was carried into execution.

I am, Sir,

*A. Aikin, Esq.*

&c. &c. &c.

*Secretary, &c. &c.*

THOMAS WILKINSON.

CERTIFICATE.

Gatten,  
September 20th, 1820.

WE, the undersigned, do hereby certify, that Thomas Wilkinson, Esq. planted upon his Gatten estate (on the south-east side of the Stiperstones-hill), in the parish of Ratlinghope, and county of Salop, in the months of October, November and December 1818, 120 acres of land with Acorns; that there are now growing upon the said lands considerably more than 300 young oak plants on each acre, which have been effectually preserved in order to raise timber, and are now in a healthy and thriving state (specimens are sent); that the said lands are properly and securely fenced, and are unfit for husbandry. The soil varies considerably, but is chiefly of a loamy texture.

JAS. SMITH, *Coppice Green, near Shifnal,*

WM. JACKSON, *Pulverbatch, near Shrewsbury,*

SAM. SMITH, *10, Gray's-Inn-Square, London.*

*Appendix to Certificate.*

Gatten,  
September 20th, 1820.

In addition to the 120 acres of land planted with acorns by Thos. Wilkinson, Esq., upon his Gatten estate (on the south-east side of the Stiperstones-hill), in the parish of Ratling-hope, and county of Salop, in the months of October, November, and December 1818, and for which he is a candidate for the Gold Medal, given by the Society of Arts, &c. he planted 140 acres more, upon the same estate and at the same time, making together 260 acres planted with acorns; but the 140 acres being a good deal covered with underwood of hazle, birch, alder, some oak, &c. : it cannot be certified that there are now growing 300 young oak plants on every acre, as they cannot be seen, except in the bare places where they appear in great plenty; and there can be little doubt that there are many more than that number, as the whole of the land was planted at intervals, of from two feet six inches, to three feet asunder, in the following manner :

The acorns were dibbled in by a company of men, each having a pointed hatchet in his hand to make a hole in the ground with, and a pocket hanging before to carry the acorns in. The men proceeded in regular order, as close as they could conveniently walk, making a hole in an oblique direction at every step, putting an acorn into it, and placing the foot firmly upon it to cover it.

An overseer walked behind the men, to see that they performed their work properly, and at about every 30 yards placed a stick in the ground with a white mark on the top, in the line where the last man went, which served as a guide to the first man in returning, showing him how far was planted; as soon as he (the first man) had passed the stick, on his

return, the overseer again removed it into the line of the last man.

The men planted, upon an average, about 14 quarts per day each. There were 240 bushels of acorns planted upon the 260 acres of land; the cost of the acorns was 3s. 3½d. per bushel; planting 3s. 8½d. per bushel; average cost per acre, including acorns and planting, 6s. 5½d.; men's wages 20d. per day.

To prevent the depredations of vermin, the acorns were moistened with water, and well dried with common sulphur, previous to their being planted.

All the land planted is quite unfit for the purposes of husbandry, being chiefly steep sides of hills, and boggy dingles, covered with heath, &c. and full of large loose stones; it is very well adapted for the growth of oak (being principally of a loamy texture), and both the oak trees and stools growing there before, and the young plants, have a very healthy appearance, and thrive well.

To secure the above lands from trespass, stone walls, 5 feet 6 inches high, have been built to the extent of 1,900 yards, and strong fences with deep ditches made, 9,000 yards in length. The wet and boggy places have been drained by open ditches, to the extent of 14,000 yards.

JAMES SMITH, *Coppice Green, Shifnal.*

SAM. SMITH, *10 Gray's-Inn-Square, London.*

## N° VI.

## SOWING ACORNS.

*The large SILVER MEDAL of the Society, being the second premium offered, was this Session awarded to CHARLES FYSHE PALMER, Esq. M. P., of Wokingham, Berks, for SOWING 216 BUSHEL OF ACORNS on 240 Acres. The following communication has been received on the subject from Mr. PALMER.*

SIR;

Wokingham,  
February, 1821.

As a premium has been offered by the Society for the Encouragement of Arts, Manufactures, and Commerce, “for having set between the first of October 1818, and the first of April 1819, the greatest quantity of land with acorns,” &c. &c., “in order to raise timber,” I beg leave to state, that in the Autumn 1818, I collected 216 bushels of acorns (each bushel containing about 8,000 acorns), which were planted in the months of October, November, and December of that year, and in the Spring of the next year, in the following manner, on forest land, not capable of husbandry :

The ground was, in the first place, loosened to a proper depth by means of instruments of my own invention, and which are particularly described in my communication on



planting forest trees, which accompanies this paper. The acorns were then set a yard asunder, in lines, partly by means of the dibble, and partly by means of the spade, which latter mode I am on the whole disposed to prefer, as by thus raising the ground sufficiently to insert the seed, it becomes imbedded in a soft porous medium, peculiarly favourable to the progress of the root in its most tender state.

The great extent of the plantation obliged me to employ two men with guns, and several boys stationed in different places, in order to frighten away the rooks and other birds, the expense of which, when continued through the Winter and Spring, added to other sufficiently obvious reasons, induces me to recommend the planting of acorns in the spring only, as at that season the attention of the rooks will be divided between the farmer and planter, and as at all events the necessity of guarding the land from these depredators, will not exist during more than two months. The plants have come up in vast abundance, are healthy and thriving, and if properly thinned from time to time, will probably become fine timber, notwithstanding the incorrigible barrenness of the soil as regards agricultural produce.

I find no difficulty in preserving acorns through the Winter, by mixing them with dry sand and cinder dust, and spreading them about eight or ten inches deep on a dry floor: during the severity of the frost I cover them with straw, or any other long litter.

I am, Sir,

*A. Aikin, Esq.*

&c. &c. &c.

*Secretary, &c. &c.*

CHARLES FYSHE PALMER.

## CERTIFICATE.

WE whose names are hereunto subscribed, do hereby certify, that we are well acquainted with the plantations in question, and that we believe the foregoing statement to be true and exact, and that there are not fewer than 300 young oaks on each acre planted.

THOS. MORRES, *Minister*.

J. WEBB.

W. LANE.

JOHN ROBERTS.

E. HORNE.

J. B. TRICKEY.

JOHN CHURCHMAN.

E. SMITH.

J. BROWN.

N<sup>o</sup> VII.

## EMBANKING LAND FROM THE SEA.

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*The large GOLD MEDAL, the premium offered, was this Session presented to EDWARD DAWSON, Esq. of Aldcliffe Hall, near Lancaster, for EMBANKING 166 ACRES OF MARSH LAND FROM THE SEA. The following communication has been received from the candidate on the subject.*

SIR;

Aldcliffe Hall, near Lancaster,  
November 10th, 1820.

I BEG leave to present a claim to the Society for the Encouragement of Arts, &c., for the premium offered in No. 34 of their list of rewards published this year. I transmit the certificates required by the Society, and hope they will be deemed satisfactory.

The inclosure, the consideration of which I have the honour to submit to the Committee, consists of 166 acres, 3 roods, 8 perches of land, known by the name of Aldcliffe Marsh, about two miles distant from the mouth of the river Lune, and one mile from Lancaster. It was, with the exception of about three acres, swarded over, and has heretofore been attached as a sheep pasture to the different farms on the manor of Aldcliffe; it was estimated at a low rent, as it was in a great measure overflown by the spring tides, and being intersected by a deep pool, the sheep were frequently surrounded by the water, and consequently lost.

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My first operation was, to convey the land waters from this pool into the Lune, which was done by opening for them a new channel through part of the old inclosures, from nine to twelve feet deep, and 246 yards in length. This cut was walled and covered with stone, and terminates with a hewn culvert of the same material, four yards in length, and two feet square.

On the 8th of May last, the embankment was commenced. It runs parallel with the Lune, which is in that part about a mile and a half in breadth at high water. The highest tides are with a south-west wind, which causes them to set in with considerable violence. The length of the embankment is 2,010 yards; for the first 200 yards at the north (or higher) end, I satisfied myself with a slope of 5 horizontal to 1 perpendicular; in the next 1,400 yards, the slope is 6 to 1, and where the pool formerly discharged itself, it is for 300 yards 7 to 1; the remainder being on higher ground, is 5 to 1; its height averages about 8 feet 6 inches, the greatest perpendicular height being 14 feet 6 inches; the whole of the inside slope is 2 to 1. It is entirely composed of sand, with the exception of the deep part, which is formed of clay, the sand being there worn away by the violent reflux of the tide. Its contents are as follows:—69,456 cubic yards of sand, covered by 53,078 superficial yards of sods or turf 4 inches thick, employing 3,824 horses, and 5,843 men, supposing it had been completed in one day.

In order to give employment to the poor of this neighbourhood, I contracted with five different persons; the whole was completed in August, many difficulties retarding it, from the unusual quantity of rain during the Summer months. On the 29th of May, a violent storm of wind raised the tide, and swept away 1,800 yards of material, which would have totally discouraged the contractors, who had no property, and could

not have sustained the loss, had I not reimbursed them. I am thankful to say the high tides in September and October have not made the slightest impression, and the whole of the work carries with it every appearance of stability. I apologize, Sir, for the length of this communication ; the desire expressed in the rules of the Society, that a detailed account should be given of works of this kind, must plead my excuse.

I am, Sir,

&c. &c. &c.

EDWARD DAWSON.

The Equinoctial tides in September, were the highest in the last twenty-four years.

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CERTIFICATES.

November 10th, 1820.

THIS is to certify, that Edward Dawson of Aldcliffe Hall, has, during the Summer of the present year, effectually inclosed and secured from the overflow of the tide, all that tract of land, near Lancaster, called Aldcliffe Marsh.

R. ATKINSON, *one of His Majesty's Justices of the Peace, for the County Palatine of Lancaster.*

November 10th, 1820.

I do hereby certify, that Edward Dawson, of Aldcliffe Hall, has, during the Summer of the present year, inclosed and effectually secured from the overflow of the sea, all that tract of land, near Lancaster, known by the name of Aldcliffe Marsh.

THOS. BOWES, *Deputy Lieutenant for the County of Lancaster.*

N<sup>o</sup> VIII.

## EXPERIMENT ON DRAINING.

*The Thanks of the Society were this Session voted to JOHN CHRISTIAN CURWEN, Esq. M. P. (a Vice-President of the Society) for the following communication, detailing the successful result of an EXPERIMENT ON DRAINING.*

London, January 28th,  
1821.

DEAR SIR;

INCLOSED, I have the honour to transmit for the Society a paper on Draining; if it should be considered as worthy of the attention of the Society, I shall be greatly flattered.

I have left the country in great distress, and numbers of poor people out of employment. I hope to have the honour of paying my respects to you soon. I disposed of the rice you sent me into various hands. I have planted the wheat in my own garden.

I am, Sir,  
&c. &c. &c.

A. Aikin, Esq.  
Secretary, &c. &c.

J. C. CURWEN.

Workington Hall,  
January 17th, 1821.

The encouragement given by the Society of Arts, for the improvement of Agriculture, and every useful undertaking, emboldens me to submit to them the details of a work recently executed.

In the present state of the country, more important service cannot be rendered it, than suggestions for the profitable application of capital to labour.

Draining has universally been allowed to be the first and most essential step towards the permanent improvement of land. Fully as all writers are agreed upon this point, the cost that may profitably be expended in accomplishing this desirable object, is by no means ascertained; nor till a few months ago, should I have ventured to have estimated its advantages, as I feel myself now justified in doing. A recent occurrence brought this point strongly under my observation.

It may appear strange, that after twenty years assiduous attention to Agriculture, I should not have formed a pretty correct estimate of the injury sustained from the want of a proper drainage of spring and surface water on any one crop; but so in truth was the case.

A field of 40 acres on the Schoose farm, was last year cropped with Swedish turnips; the land was winter fallowed, and in the highest state of tillage, so as to admit of the turnips being sown in the latter end of April, previous to the long-continued wet, which proved so destructive to the turnip crop in the North of England: it had 30 tons of good dung per acre. The crop averaged on 38 acres, 32 tons and a quarter per acre, that is, twenty-six of bulbs, and six and a quarter of tops; the produce of two other acres scarcely reached twenty tons. The soil and management was the same throughout. It is a strong clay, by no means applicable to the growth of turnips; but the farm afforded no other soil more proper for the purpose. These two acres had by some means been overlooked, when the rest of the field had been drained. The injury arose partly from springs, and partly from the surface-wet resting upon the land. The value of Swedes in common years, is 10*s.* a ton for the bulbs; in the present year they would have sold at 15*s.*

The loss, therefore, on 12 ton of bulbs, was eighteen pounds, besides the tops, which at 2s. 6d. a ton, would have amounted to 1*l.* 10s., making a total of 19*l.* 10s.

Seventy-two rods of drains (seven yards to the rod) were immediately cut, the cost of which was 5s. a rod, or 18*l.*

Had the drainage been executed previous to putting in the crop, it would have been more than paid for by the produce of the present year.

That good often results out of evil, was never more fully exemplified; and with such a striking instance before me of the advantages resulting from completely freeing the land from water, I was powerfully stimulated to undertake the re-drainage of a field of eighty acres, adjoining the Schoose Farm-buildings, and within less than half a mile of the town of Workington.

I was still further excited by the daily and hourly applications for labour, arising, I fear, from the decreased and decreasing capital of the farmer.

The scale of labour has annually been declining, which cannot but be a matter of deep regret to every friend to the country.

The nation has witnessed scenes of great distress during the years of scarcity; but these bore no comparison to the present times.

The hope of the privations being temporary, gave courage to bear up against them: but now the future has nothing to invigorate exertion, or inspire fortitude. Numbers are daily forced into the ranks of pauperism against their will. Industrious habits are destroyed, and with them that providence and forethought which is the basis of the happiness and respectability of the working classes. In order, not only to continue in employment the usual hands, but to extend it to the employing of others, at a season when the active labours of the year are nearly



closed, I determined on undertaking the re-drainage of Walriggs, a field of eighty acres, which had been drained about 18 years before, in a manner then considered to be effectual.

The main-drains, as far as they go, were well done, and these have been made available in many instances in the present drainage. They all run into the ditches which surround the whole, from which there is a considerable fall on every side of the field. The collateral drains were only twenty inches deep, set with three stones, in the form of a triangle, having about eight inches of cover upon the top. A drain of 20 inches was then thought to be sufficient, and all that was aimed at, was to cut off the springs, no regard being paid to carry off the rain-water, which is so injurious to clay land.

Subsequent experience has shown that, in most instances, the stratum which holds the water is at so great a depth, as to be below the bottom of such shallow drains; that to do the work effectually, the drain must reach the stratum where the wet rests.

The importance of deep ploughing was not heretofore known, or provided for.

Five years ago this field was deep ploughed; it had been foreseen, that in many instances the plough was likely to come in contact with the head of the drains: this did happen, and the consequence has been to render the land as wet, or nearly so, as it was before any thing was done to it.

Fifty out of the eighty acres were greatly injured by water. The annexed plan will point out the manner in which the work has been executed. It was commenced in November, and was finished the second week in January.

The cutting was lett, as it requires practice to keep the drain the exact width. Bad hands are apt to increase the dimensions, and thereby greatly augment the expense of filling,

which is the expensive part of draining. Gathering and getting stones was done by the day, and employed a number of women and children, besides the persons occupied in the quarries, which were fortunately near at hand. The depth of the drains is from  $3\frac{1}{2}$  feet to four feet; the breadth, twenty inches at the top and twelve inches at the bottom. The drains have a cavity at the bottom of six inches, being set with two side stones, and a cover, and then filled with stones to the top, the six inches next the top being filled with small stones, that in case the plough should strike into them, no injury is done to the drain. The drains are thus filled to within ten inches of the surface. It required a solid yard of stone to fill a rod of seven yards; in weight above two tons.

To furnish such an enormous quantity of stones as eight hundred and fifty-nine rods required, was an undertaking of no small difficulty, and could not have been executed in the time, had not other substitutes been found. In coal countries there are strata known by the name of sill or schistus, and rattler, which is a mixture of coal and schistus. Sill is a substance that will not bear exposure to the atmosphere, but rattler does not fall, and is very light in comparison to its bulk.

Recourse was had to these substances, and many hundred cart-loads of both were collected from the coal-banks; the remainder was gathered from the ground, and obtained from the quarries.

	s.	d.
The cutting, filling, and setting was	1	3 a Rod
Collecting stones, supposing two gathered to each rod .....	0	8
Two Carts from the quarries .....	1	0
Leading .....	2	0
Cutting the drains by the plough ...	0	1
	<hr/>	
	5	0

The distance the sill and rattler had to be led, so increased the cost of cartage, as to make their cost equal to that of stones.

	<i>l.</i>	<i>s.</i>	<i>d.</i>
Cutting and filling 859 rods of 7 yards, at 1 <i>s.</i> 3 <i>d.</i>	53	13	9
3,436 cart-loads of stones for filling, at 10 <i>d.</i> a cart	143	3	4
Carting the above, at 6 <i>d.</i> .....	85	18	0
Filling, at 1 <i>d.</i> .....	14	10	6
	<hr/>		
	297	5	7
	<hr/>		

Fifty acres of the field have been benefitted by this drainage. The general quality of land deciding the value at which it would be estimated to let, it was considered as worth 40 shillings an acre; from its locality, I conceive I am within bounds, when I rate it as worth from 50 to 55 shillings. The expenditure of two hundred and ninety-seven pounds, has added sixty pounds to the value of the field, which is obtained at five years purchase, or a little less for interest. It is to be observed, the horse-work is valued as if it had been hired; the real cost of that part, done at such a season, is not, to a farmer, one-half. My object was to put the cost at the highest point, more strongly to enforce the advantage resulting from the practice, as it thus leaves nothing to object to.

This field had in the last course 30 tons of manure; it is strong clay. First crop, potatoes, product 26 hundred stone per acre: sown with wheat and clover; both these crops were admirable. The oats this last year are calculated to produce 60 Winchester bushels per acre; it is now preparing for green crop again, and to have 50 tons of manure per acre. Admitting the green crop to profit three pounds per acre by the drainage, which is only half what was lost at average prices this year on the Swede crop, this on the 50 acres would be one hun-

dred and fifty pounds ; calculating it to yield three Winchester bushels per acre more of wheat, at 7s. per bushel, this would be fifty-two pounds ten shillings and ten-pence per acre ; for the clover for two years 50*l.* more, making a probable increase of produce, without any extra expense, of 252*l.* 10*s.* Thus, in a five years course the whole expense will, in all probability, be repaid, and an annual permanent increase of rent, to the amount of 60 per cent, gained.

Wet is more destructive to pasture than it is to grain and green crops ; and as pasture is the most material object near to towns, draining, in such situations, is a more profitable improvement than in any other situation, and will consequently justify a greater expense.

When once dry land is well laid down to pasture, the improvement is permanent. If flooded with water, it cannot remain for any length of time in pasture, but must be again brought under tillage. On wet soils, improvement is almost labour in vain—costly at all times, but now ruinous.

Should the Society deem this undertaking as meriting their attention, it will be highly gratifying to me, who owe them many and great obligations.

The ambition of meriting the honour of their rewards, first directed my attention to agriculture, and I trust the result has not altogether been without its advantages to the public.

I am, Sir,

&c. &c. &c.

JOHN CHRISTIAN CURWEN.